Das Wasser. By Dr. O. Anselmino. Pp. vi+122. (Leipzig: B. G. Teubner.) Price 1.25 marks.

This booklet is the 291st volume of a popular scientific and literary series. It embodies the material used in a course of experimental lectures given at Griefswald in 1907. The subjects dealt with include the chemistry of water, mineral waters, the purification of water, drinking water, mineral waters, and diffusion. The text is illustrated by forty-four diagrams, most of which have been taken from text-books of chemistry, to which due acknowledgment is made. The author has brought together a large array of facts, the tabulated analyses of various waters, including a long series of mineral waters, being a conspicuous feature of the book. The chapter of chemistry covered by the title is an important one, and it is probable that its treatment in a separate volume may prove to be a convenience to a considerable class of readers.

What Nature Is. An Outline of Scientific Naturalism. By Chas. K. Franklin. Pp. iv+74. (Boston: Sherman, French and Co., 1911.) Price $0.75 net.

A well-written argument for "scientific naturalism" as against the argument from design, which sees intelligence in nature, inferring therefrom a creator. Mr. Franklin rejects anthropomorphic theism, also idealism, but seems to finish up in a kind of mysticism. "It is the character and quality of matter and energy to develop" man and the social process, just as it is for them to manifest themselves in the inorganic and organic processes. New thoughts, feelings, volitions, religion, &c., are merely manifestations of "radiant and gravitant energy." But somehow we shall eventually "be able to comprehend what the universe is, conceive infinite time and infinite space by looking in upon ourselves and seeing the infinite repeated in us, and understand the inmost nature of things. Just as the time was when life was not self-conscious, then became self-conscious and class-conscious, and to-day is imperfectly socially conscious; and so the time will come when we shall be universally conscious" (pp. 71–72).

Perhaps so; it is interesting as a speculation, and the author has probably been reading Dr. Bucke's "Cosmic Consciousness." But Mr. Franklin is rather dogmatic, and is a little apt to slide into speculation suddenly after writing a good deal of sensible science; the reader therefore has to keep an eye on him, and to guard against too hasty following. Moreover, the reduction of everything to "energy" does not in the least resolve the ultimate mystery of things, as Tyndall, for instance, saw plainly enough.

Morale de la Nature. By M. Deshumbert. Second edition. Pp. 96. (Paris: Schleicher Frères, 1911.) Price 1.50 francs.

We have here the second French edition of a book which, since its first appearance, has been translated into English by M. I. M. Hartmann, and published by Mr. D. Nutt, under the title, "The Ethics of Nature." The original work led to the formation of the "Ethics of Nature Society," which is an association for the harmonious development of life. The present edition of M. Deshumbert's book has been revised and enlarged.

Carnations and Pinks. By T. H. Cook, J. Douglas, and J. F. McLeod. With eight coloured plates. Pp. xi+116. (London: T. C. and E. C. Jack, n.d.) Price 1*s*. 6*d*. net.

The latest addition to the "Present-Day Gardening" series will be welcomed by all active horticulturists. Being the work of expert cultivators of the flowers with which it deals, the volume should soon become widely known and consulted on account of the practical hints it contains.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* Nature. *No notice is taken of anonymous communications.*]

Stability of Aeroplanes.

The following simplification of Lanchester's formula for longitudinal stability of tailed monoplanes may be useful.

His formula is

$$\Phi = \frac{4 l H_n^2 \tan \gamma}{I\left(\frac{1}{K} + \frac{1}{c C \rho \epsilon \alpha \beta}\right)}.$$

("Aërodonetics" ρ 101).

Here H_n is the height corresponding to the normal velocity of the machine $= V_n^2/2g$ and $I = WR^2$ where R is the radius of gyration about a transverse axis through the centre of gravity, and K is gW/V_n^2, where W is the mass in pounds.

$c = 3{\cdot}0$, $C = 0{\cdot}7$, $\rho = 0{\cdot}08$ pounds per cubic foot, $\epsilon =$ about $0{\cdot}6$ for tails of moderately high aspect ratio, so that $cC\rho\epsilon = 0{\cdot}1$ nearly.

Hence

$$\Phi = \frac{l V_n^4 \tan \gamma}{g^2 R^2\left(\frac{V_n^2}{g} + \frac{10W}{\alpha\beta}\right)}.$$

(See "Problem of Flight," 2nd edition, p. 114.)

For most machines with pterygoid aërofoils of approved camber γ and β are about $\frac{1}{6}$ radian.

Further the value of W (pounds not poundals) is connected to the supporting area by approximately the equation $W = 0{\cdot}0016\,AV^2$ so that $V = 20$ to $30\sqrt{(W/A)}$, or say $30\sqrt{w}$, where w is the lift in pounds per sq. foot.

Hence approximately

$$\Phi = \frac{l \times 30^4 \times w^2 \times \frac{1}{6}}{1024 R^2\left(\frac{30\sqrt{w}}{32} + \frac{10W}{a \times \frac{1}{6}}\right)}$$

taking $\Phi = 1{\cdot}5$ and writing $W = wA$, we get very nearly

$$l = \frac{R^2}{500}\left(w^{-\frac{3}{2}} + 60 w^{-1}\frac{A}{a}\right)$$

thus expressing the length of the tail in terms of the radius of gyration, the loading per sq. foot, and the ratio of the supporting area to the tail area.

For example, if $\frac{A}{a} = 10$, and $w = 2$ lbs. per sq. foot,

$$l = \frac{R^2}{500}\left(0{\cdot}35 + 300\right) \text{ or roughly } \tfrac{3}{5}R^2.$$

Thus a machine the radius of gyration of which is 7 feet, loading 2lbs. per sq. foot, and having 10 per cent. tail area, needs a tail with $\frac{3}{5} \times 7^2$, say 30 feet radius of action (*cf.* Bleriot machine).

Herbert Chatley.

Tâng Shan, Chih-Li (*via* Siberia), February 27.

The Daintiness of the Rat.

One of the principal sights in Bordighera is the garden of the Villa "Charles Garnier." It is called after its late owner, the famous designer of the Grand Opera at Paris and the Casino at Monte Carlo. It was probably when he was engaged in building the Casino that he acquired the large and valuable property which bears his name.

The garden covers more than five acres, and is a mass of tropical and subtropical vegetation. The banana trees bear fruit which ripens every year. The gardener, a very civil and intelligent man, speaks English, and he told me he had worked for more than a year in Kew Gardens, which he much admires, and endeavours to imitate when his means permit. He was especially proud of his ticketing the plants after the Kew model.

Not being a botanist, I was unable to appreciate adequately his attention in showing me the treasures of his garden, and it was perhaps owing to his perceiving

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this that he directed my attention to an allied circumstance which interested me much.

He informed me that the greatest trouble which he had was with rats, the *forest rats* he called them. They spend the winter in the garden, and, while causing a good deal of general damage, they evince a remarkable selectiveness in their taste for fruit. It appears that they have a great preference for the lemon and the mandarin, which are abundant in the garden. A number of the trees carried zinc guards on their trunks to prevent the ascent of the rats; but in a terraced garden on a steep slope there are many which cannot be protected in this way, because a rat easily jumps from a higher terrace on to the upper branches of a tree growing on the terrace below. By this means they had boarded and plundered quite a number of trees. They touched only the lemon and the mandarin trees, disregarding the common orange. But what seemed to be most remarkable was the different way in which they treated the fruits of these two trees. Of the lemon they eat the rind, removing it completely, and leaving the peeled fruit, clean and without a blemish, still attached to the branch which carried it. On one tree there were eight or ten such freshly peeled lemons still in their places on the tree, and they presented, among the others, a very curious aspect of nakedness. Having boarded a mandarin tree, the rat treats the fruit in the opposite way; he eats the inside and leaves the empty skins hanging on the tree. On one tree that I saw, nearly the whole of the fruit had been treated in this way. Something similar may be witnessed with us on gooseberry bushes in a summer when wasps are abundant. The reason for the different treatment of the two fruits is probably not to be sought further than in the fact that the inside of the mandarin is sweet and that of the lemon sour.

So long as there are mandarins and lemons, the common orange remains untouched, but when there are no more of these two they eat the common orange. By the time these are finished the fields and woods outside are beginning to furnish food, and the rats leave the garden, not to return until the winter begins again.

In answer to my inquiry, the gardener said the rats never attempt to enter the villa; they are forest rats. I asked him if they were a special kind; he said they were brown rats; and I asked him if they were different from the rats he had seen in England, and he said no.

The daintiness of the rat, shown not only in the choice of his fruit, but also in the part of it which he will eat, is not the only feature of rat life which is illuminated by the experience of the gardener of the Villa "Charles Garnier." The annual migration back and forward from the open and natural surroundings of the field and forest, where in summer food is being naturally produced in abundance, to the restricted environment of the highly cultivated garden, where in winter food is produced only by artificial devices, becomes more remarkable the longer it is contemplated. The whole area of semi-tropical garden on the Riviera is an insignificant quantity compared with that of the open ground, so that the proportion of the rat population which is able to enjoy the winter *villegiatura* must be very small, and must be chosen or evolved by a rigorous system of selection, which probably rests on the fundamental principle, the right of might.

In a fertile country like that of Liguria the rats, which are obliged to remain *fore le muri*, are no doubt able to pick up a subsistence during the winter, but they cannot afford to be so dainty as those that are able or privileged to occupy the gardens. In any case, I suppose, it may be taken to be true that a hungry rat will not hesitate to eat a healthy brother rat if he can waylay him or overcome him in combat. It is not improbable that this is the natural winter food of many tribes of rats which inhabit countries where food has its seasons of plenty and scarcity. The shortage thus produced in the winter is quickly made up by the splendid fruitfulness of the mother rats when the food season returns, and the population, over the year, need show no diminution; indeed, there is nothing to prevent it showing an increase. In nature there are accumulators of all kinds.

We have seen, on the evidence of the fruit trees of the garden, that the rats occupying it must live in that state of luxury in which the sensation of real hunger is not felt. How do they keep such a garden of Eden to themselves?

That the common oranges remain as a reserve to the end of the season shows that overcrowding is effectively prevented. We have seen that the lemon and the mandarin are preferred by the rats actually occupying the garden, and apparently indifferently, because the two fruits are consumed *pari passu*. As it is contrary to the animal nature for the strong to give way to the weak, we may feel certain that there is no relative aversion to either the lemon or the mandarin as there is to the common orange, or one of them would be consumed before the other.

All these facts go to show that the occupying force must be a very well-organised body, and must be directed by that degree of intelligence which teaches it, not only to drive and keep out strangers, but also rigorously to keep down its own numbers to the point at which it can, on the basis of experience, expect to pass the winter without being reduced to the necessity of eating common oranges.

Bordighera, March 20.

J. Y. Buchanan.

The Fox and the Goose.

The interesting story concerning a fox and its fleas related by Prof. McKenny Hughes recalls one told me many years ago by an old gamekeeper on Lord Ilchester's estate at Redlynch, in Somerset. The park at Redlynch is enclosed with a rough wall about 5 feet high; the keeper's cottage is in the line of this wall.

He saw one day, whilst sitting in one of his rooms, a fox coming towards the wall carrying a goose, which it had slung over its shoulders and was holding by the neck. Upon reaching the wall it tried to jump or clamber upon it, but failed. It repeated the attempt two or three times, going back a little distance and readjusting its burden each time before doing so. Finding that it could not get over in this way, it stood on its hind legs with its front feet against the wall, and, holding the goose by the neck close to the head, pushed the bill into a crack between the stones. The goose fell down, the crack being apparently too wide. A second attempt was successful, and the bird dangled from the wall suspended by the bill at almost 4 feet from the ground. The fox then leapt upon the wall, and leaning over withdrew the bill from the chink, hoisted up the bird, and disappeared with it on the other side.

E. W. Swanton.

Sir Jonathan Hutchinson's Educational Museum,
Haslemere, March 28.

The Rusting of Iron.

In an article in Nature of March 2 on the rusting of iron, an objection was raised to the work of Lambert and Thomson (Trans. Chem. Soc., 1910) on the ground that their experiments were carried out in fused quartz vessels. The writer of the article puts forward the view that fused quartz dissolves in water to produce silicic acid; that the acid produced is sufficient to dissolve the iron; that enough iron will be dissolved by the process in the course of a few hours to produce, in the presence of pure oxygen, a visible quantity of ferric oxide! He cannot have supposed that the *probability* which he discusses was not considered by the authors. The object of the work was to bring together iron, oxygen, and water, all of the highest obtainable purity, and to let them react in vessels which would be least likely to affect the reaction.

It was only after most careful experiments on the suitability of quartz vessels that they were finally chosen. A long series of experiments, lasting over several months, was carried out, in which (1) fused quartz vessels, carefully cleaned, as described in the paper, (2) fused quartz vessels lined with purified paraffin wax, (3) Jena glass vessels lined with purified paraffin wax, were used under exactly the same conditions.

The experiments were carried out as described in the paper. The apparatus was evacuated down to 0·0001 millimetre (as measured by a McLeod gauge); water was distilled in from a solution of pure baryta, the conditions being such that the water which came in contact with the

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